PLIO-PLEISTOCENE SEQUENCE STRATIGRAPHY, OUTER SHELF AND UPPER SLOPE, CENTRAL OFFSHORE LOUISIANA, GULF OF MEXICO

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ABSTRACT

The Plio-Pleistocene continental margin along offshore Louisiana is an unstable progradational margin characterized by abundant salt diapirs, major gravity-driven growth faults, and/or salt-related growth faults. Morphologies of sequences, systems tracts and their bounding surfaces are difficult to identify. The present outer shelf and upper slope, central offshore Louisiana, Gulf of Mexico, was mainly a slope environment during the deposition of Plio-Pleistocene sediments. We present a sequence stratigraphic model for this environment based on seismic, well log and nannofossil abundance data.

Within the area we identified nine 4th order sequences in the Plio-Pleistocene section. The sequences are: DS(3.72 — sequence order from Vail, 1991), DB (3.73), CM (3.81), SG (3.82 & 3.91), PAL (3.92), PA (3.93), PL (3.94 & 3.95), SA (3.96), EH (3.101), with condensed sections respectively characterized by nannofossils peaks of *D. surculus, D. brouweri, C. macintyrei, small Gephyrocapsa, P. ''annula'' (large), P. annula, P. lacunosa, ''Sangamon,'' E. huxleyi*. Each sequence is also characterized by a succession of four different facies in well logs and seismic data.

One or more high amplitude, continuous reflectors representing the basin floor fan are found in most sequences, with the reflectors downlaping in both directions onto the sequence boundaries or terminating against a growth fault. Lateral limits of the fan coincide approximately with the margins of the receiving basin. Basin floor fans are characterized by a blocky sand log pattern, containing in some cases thin shale spikes. Above these are leveed channel complexes or chaotic facies which correspond to slope fans. These channels are characterized by a series of concave-upward reflectors (channel facies) bordered by continuous, subparallel reflectors (overbank facies) which downlap away from the concave upward units. Leveed channel facies commonly exhibit a complex multistory pattern. Chaotic facies occurs along the margins of slope fans, on the downthrown margins of large growth faults, and near major salt diapirs. They generally represent deposits that have undergone soft-sediment deformation, either by loading or slumping. Some are characterized by crescent-shaped and/or bell-shaped log patterns. Nannofossil peaks may be observed at the tops of lowstand slope fans and basin floor fans. The third facies consists of semicontinuous-to-discontinuous, low-to-moderate amplitude reflectors that diverge toward the downthrown sides of growth faults or the basin side of salt diapirs, which represent the lowstand prograding complexes. Lower boundaries may be concordant with or downlap against the uppermost slope fan surface. The prograding complex exhibits mainly the flat high SP or Gamma Ray baseline. Coarsening-upward patterns typical of outer-middle and uppermost bathyal environments are not found in the area. At the top of the sequence are found transgressive systems tracts, condensed sections and the highstand systems tracts. These are characterized either by transparent reflections or are too thin to separate from the underlying systems tracts. Condensed sections above transgressive systems tracts are evidenced mainly by semicontinuous-to-continuous, low-to-moderate amplitude reflectors, high abundance peaks on nannofossil logs, and are commonly associated with authigenic minerals which cause high gamma ray values.

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